

# Advancements in Operational Hurricane Forecast Guidance from NCEP/EMC HWRf Modeling System

*Progress in hurricane forecast improvements during the last decade since Hurricane Katrina*

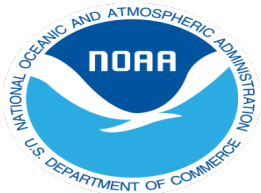
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\*NOAA/NWS/OST, HFIP Program Manager

*Ten Years Since Hurricane Katrina: Progress in Hurricane Modeling, Prediction, Decision Support, and Coastal Resilience.  
Tuesday, July 28 2015*





## Outline



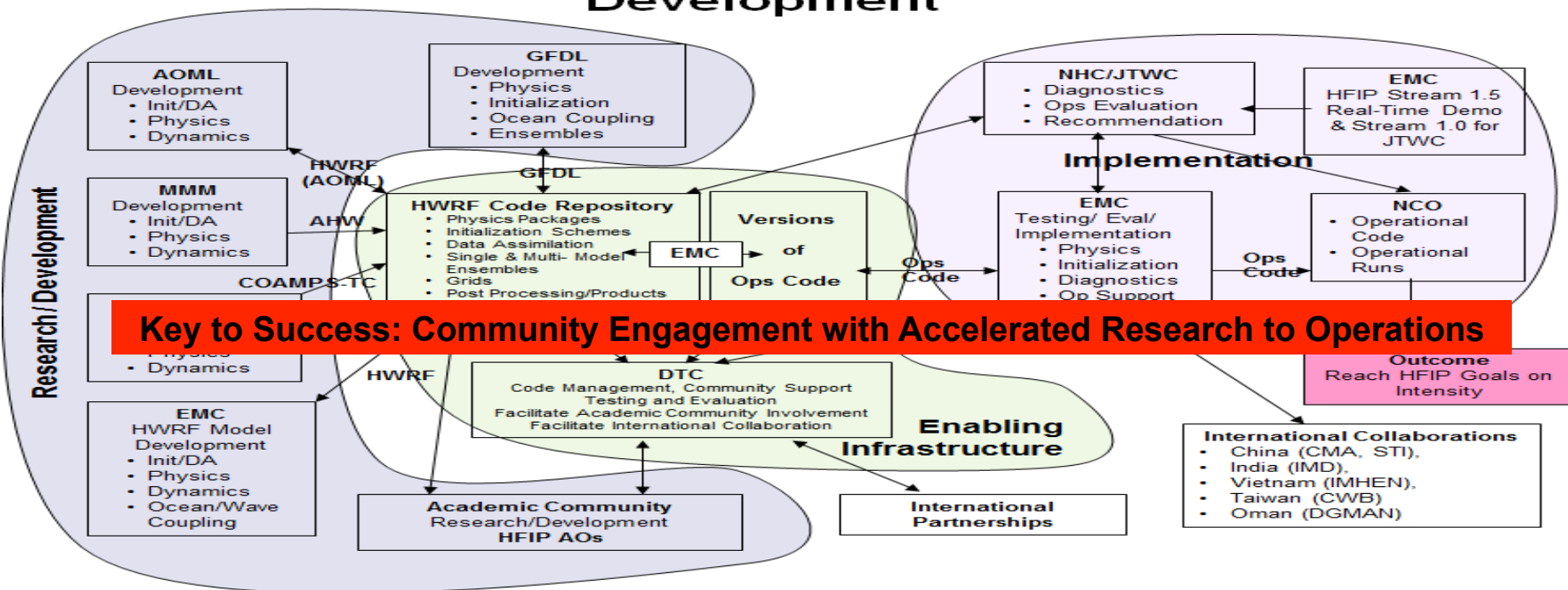
- **Progress in Operational Hurricane Track and Intensity Forecast Guidance in the past few years: Role of HFIP**
- **State-of-the-art Operational Hurricane Modeling at NCEP/EMC: A Major Collaborative Community Modeling Effort**
- **Forecasts for Hurricane Katrina using today's operational HWRF modeling system**
- **Improved understanding of hurricane intensity problem and challenges ahead**

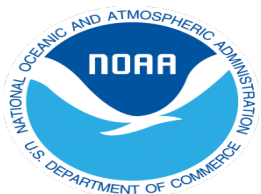


# Rapid Progress in Hurricane Forecast Improvements: Role of HFIP



## Operational Hurricane Modeling System Development

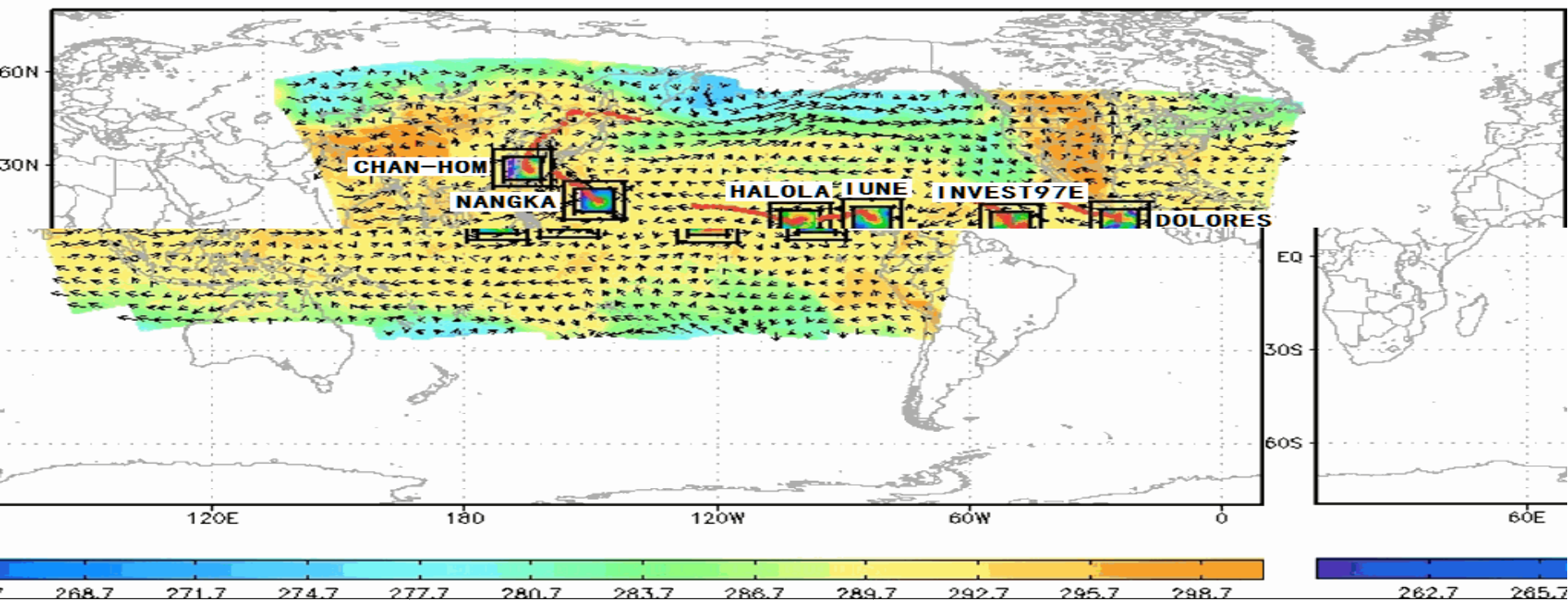




# NCEP Operational Hurricane Modeling System (HWRF)



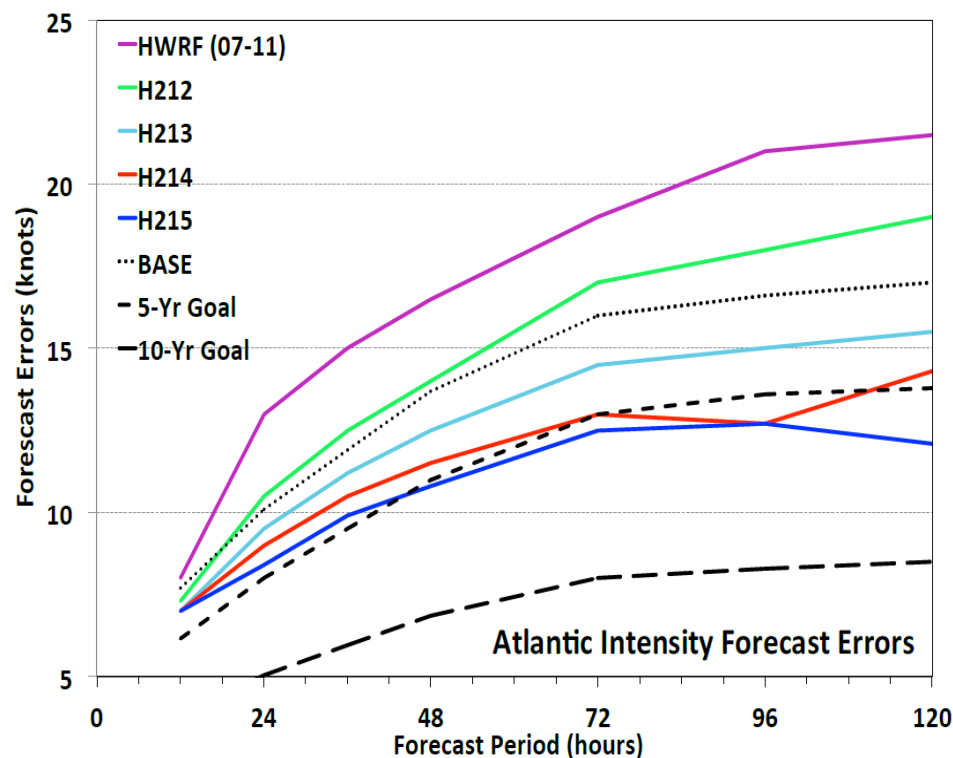
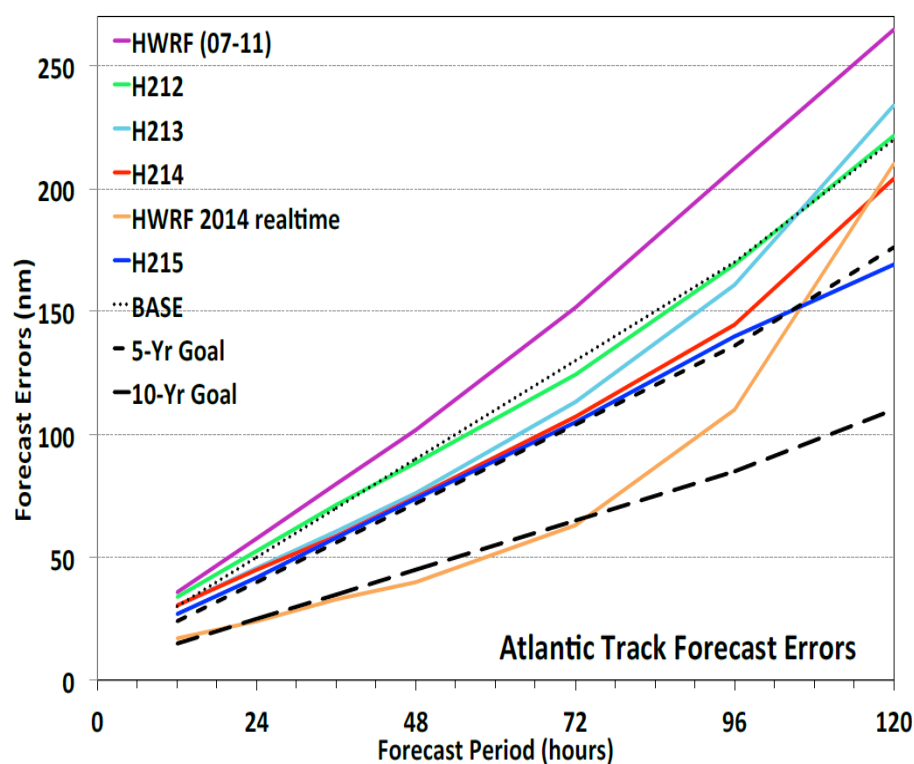
HWRF Forecast init:2015071100 F000





# Improvements in Hurricane Forecast Guidance from NCEP Operational HWRF: A Success Story of HFIP

Improvements of the order of 10-15% each year since 2012

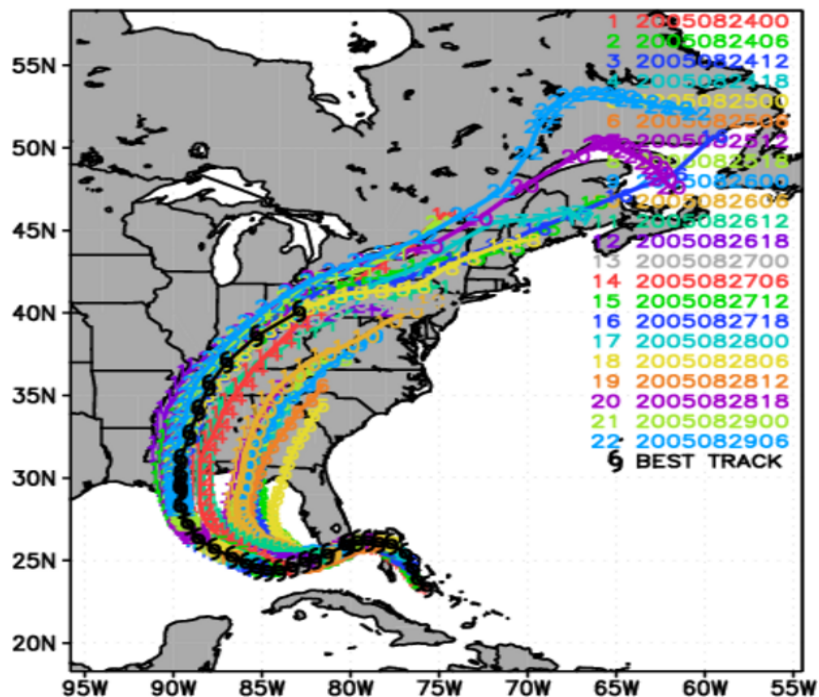




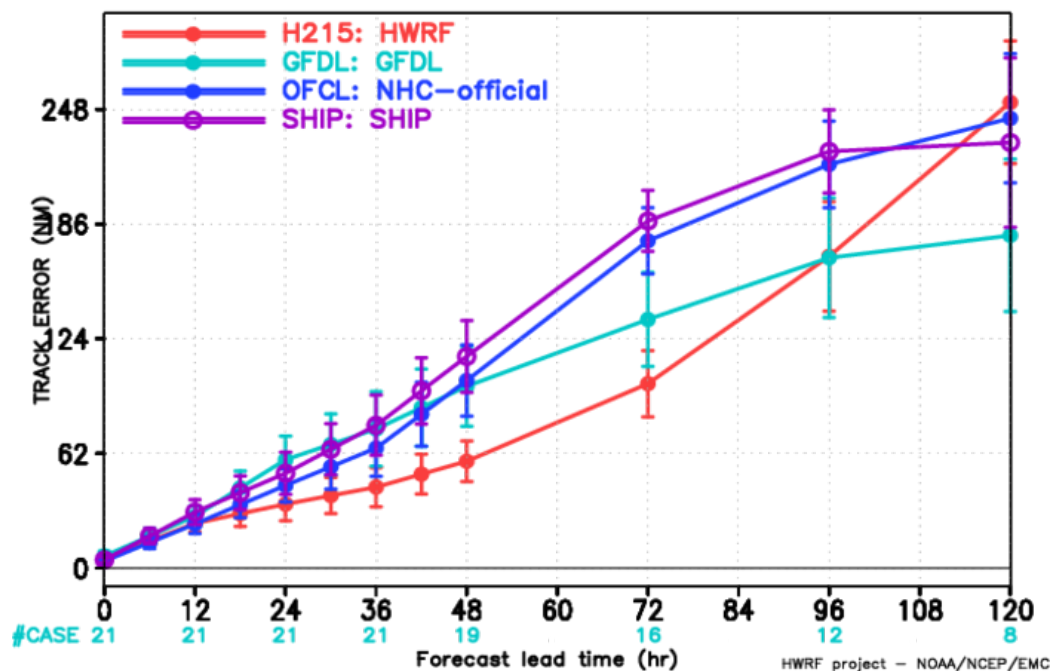
# Forecast Performance for Hurricane Katrina using today's Operational HWRF



H215 forecast: KATRINA (a1122005)



HWRF FORECAST – TRACK ERROR (NM) STATISTICS  
H215

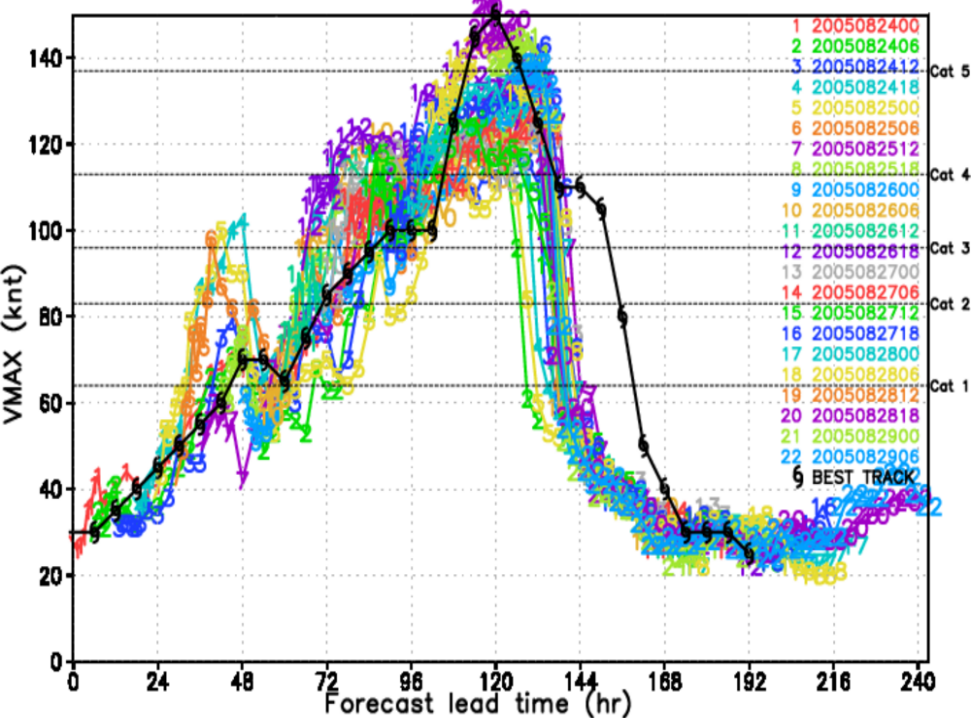


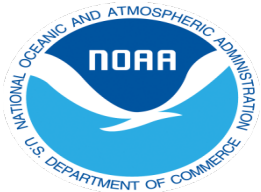


# Forecast Performance from Today's Operational HWRF for Hurricane Katrina

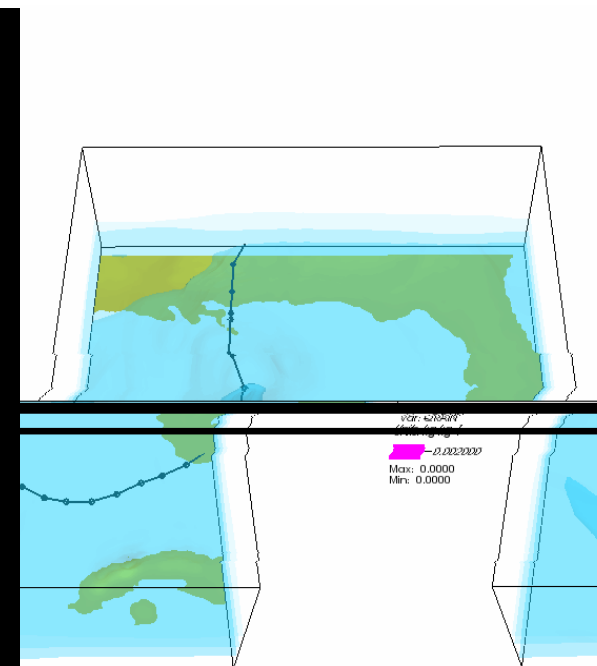
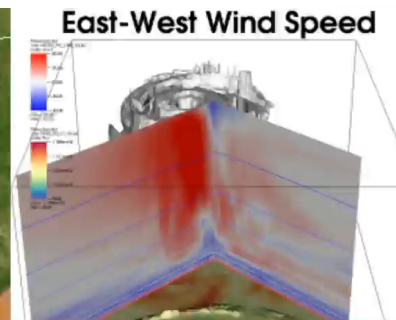
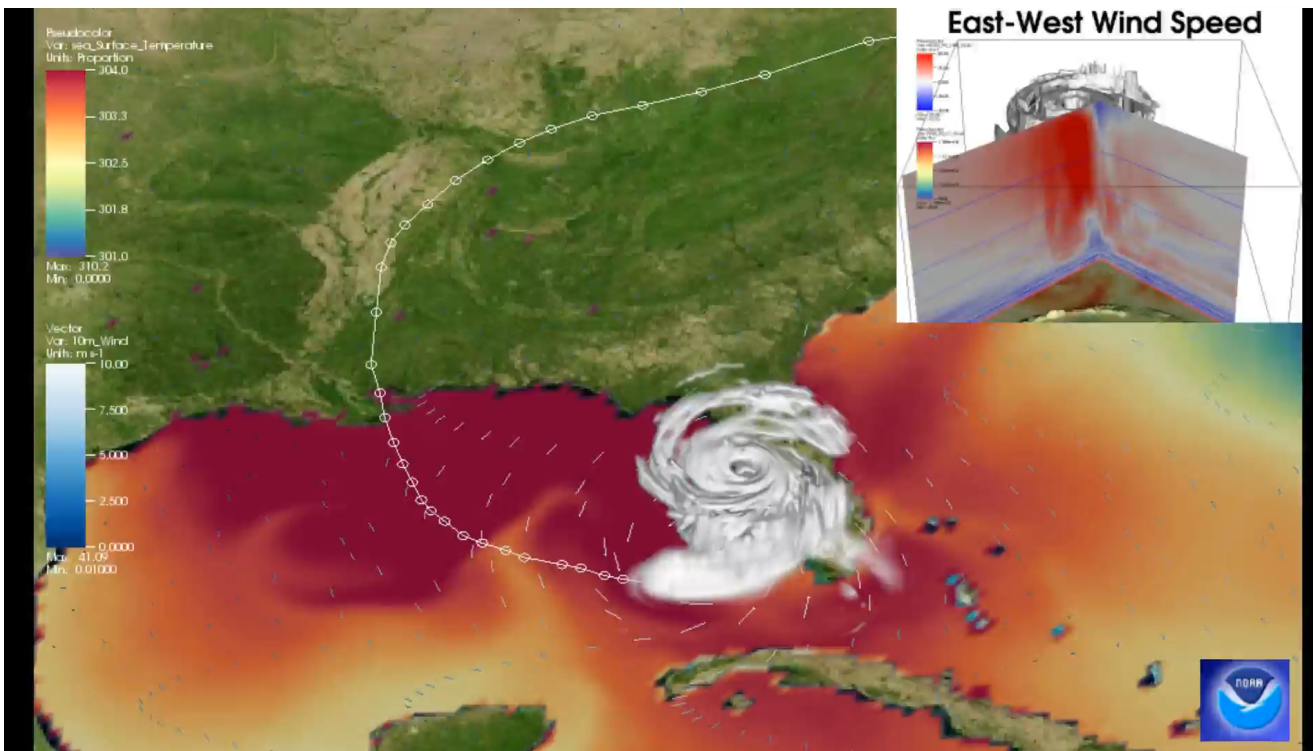


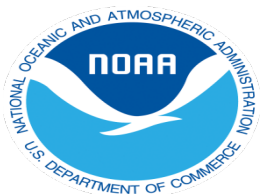
H215 forecast: KATRINA (0122005)  
Maximum 10-m wind time series





# High-Definition Views of Hurricane Katrina as seen by High-Resolution HWRF Simulations

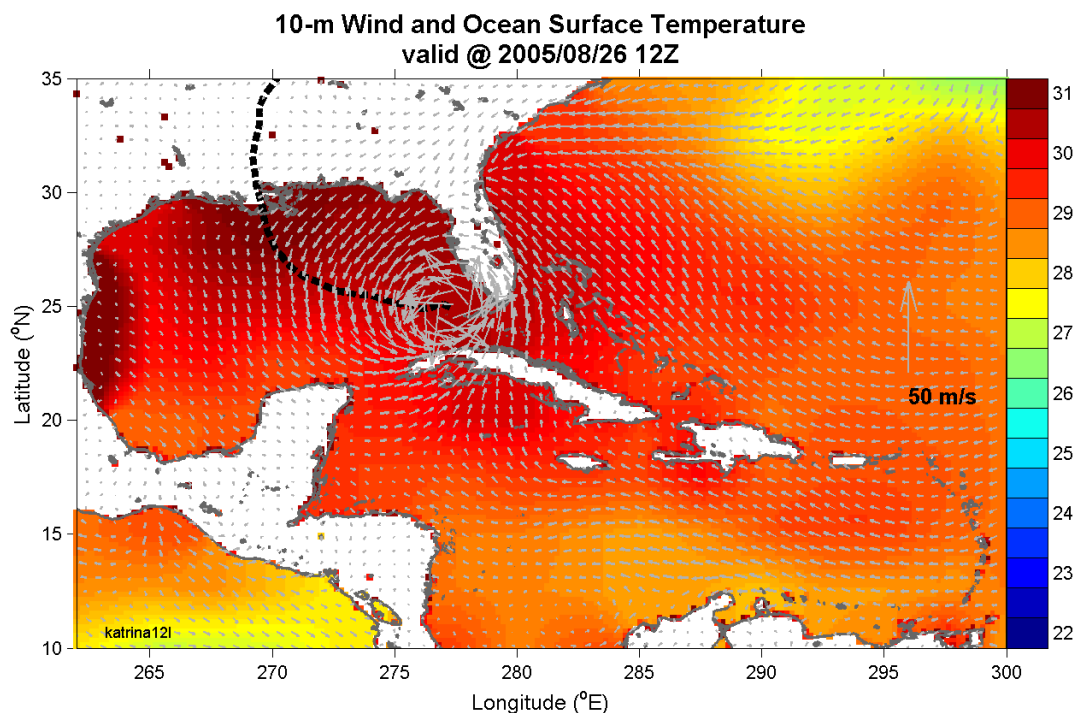




# Improved Modeling of Hurricane Dynamics, Physics, and Air-Sea-Wave-Land Interactions



- Hurricane Katrina reminds us of critical and complex interactions between atmosphere, ocean, waves and land – all need to be accurately represented in numerical models for improving the forecast guidance
- NCEP Operational HWRF has demonstrated significant progress in improving the forecasts for high-impact events like Katrina
- Future efforts will continue with emphasis on high-resolution solutions for further improvements in hurricane intensity forecasts

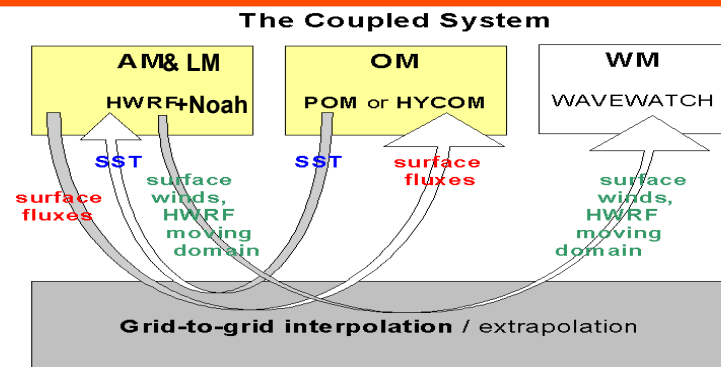




# HWRF Future Plans



- HWRF Atmosphere-Land-Ocean-Wave-hydrology coupled with self-cycled DA system
- Basin-Scale HWRF with multiple moveable nests and eventual global-to-local scale system in a unified NEMS framework
- Advanced scale-aware and stochastic physics with multi-scale interactions
- HWRF ensembles



Hybrid EnKF-GSI DA system: 2 way coupling

